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ALL-PURPOSE REPELLENT MIXTURES AS CLOTHING TREATMENTS AGAINST CHIGGERS [1]

I. H. GILBERT and H. K. GOUCK
U. S. D. A., Agr. Res. Adm., Bureau of Entomology and Plant Quarantine

Public interest in methods of controlling chiggers or red bugs *(Eutrombicula alfreddugèsi* [Oud.]) is widespread because of the serious annoyance these mites cause people in outdoor areas. The most desirable method of preventing attacks is to destroy the chiggers in their natural habitats by means of insecticidal sprays or dusts. However, this is usually impracticable or impossible because areas of infestation are generally too scattered and the number of persons affected is too small to justify the expense of area-control measures. Under certain conditions also, particularly in military operations, persons may be required to enter infested areas before such measures could be taken. In such cases reliance must be placed entirely on personal protection.

The high incidence of scrub typhus (tsutsugamushi disease) in the Pacific theater of operation during World War II brought into prominence the need for effective methods of protecting military personnel from attacks by mites. Early tests at the Orlando, Florida, laboratory of the Bureau of Entomology and Plant Quarantine (Madden *et al.*, 1944) demonstrated that the standard insect repellents, especially dimethyl phthalate, would prevent chigger attachments when applied to clothing. Just as the war ended benzyl benzoate was adopted by the Army as the standard material for treating uniforms. This material was shown (Snyder and Morton, 1946) to be effective through at least two soap-and-water washings, whereas dimethyl phthalate became ineffective after a single rinsing in cool water.

The search for new and better clothing treatments for protection against chiggers, as well as against ticks, fleas, and mosquitoes, has been continued since 1944. Studies have shown that mixtures of several good repellents are effective against a wider range of species and on more persons than any one repellent used alone. For this reason a number of mixtures were tested against mosquitoes, ticks, fleas, and chiggers. From

[1] This work was conducted under funds allotted by the Department of the Army to the Bureau of Entomology and Plant Quarantine. The report was presented at the meeting of the Florida Entomological Society at Fort Pierce, Fla., October 9-10, 1952.

these studies a new clothing treatment, designated as M-1960, was evolved and is now being used for clothing impregnation by the military services. At the present time no recommendations are made for the civilian use of M-1960, owing to the lack of sufficient toxicological data to clear the mixture for unrestricted and unsupervised use.

Mixture M-1960 contains 30 percent each of 2-butyl-2-ethyl-1,3-propanediol, *N*-butylacetanilide, and benzyl benzoate, and 10 percent of an emulsifier, Tween 80 (polyoxyethylene ether of sorbitan monooleate). Benzyl benzoate alone is highly effective against chiggers through two to three washings of uniforms and is among the most effective repellents against cat fleas *(Ctenocephalides felis* [Bouché]). *N*-Butylacetanilide has consistently been the most effective repellent against lone star ticks *(Amblyomma americanum* [L.]) and has demonstrated considerable repellency to fleas. The third repellent in the mixture, 2-butyl-2-ethyl-1,3-propanediol, is one of the most effective chemicals against a wide range of species of mosquitoes and has some repellency against ticks. The fact that each of the ingredients of M-1960 is effective to some extent against several species increases the value of the mixture as an all-purpose clothing treatment.

Clothing treated with M-1960 has proved 100 percent effective against chiggers and more than 90 percent effective against mosquitoes, ticks, and fleas through more than a week of wear, or until washed. M-1960 did not remain completely effective against chiggers through two or three washings, as did some toxicants, but since retreatment after each washing was necessary to provide good protection against fleas, ticks, and mosquitoes, it was deemed unnecessary to include a durable material for chiggers alone.

During the last two years, 20 promising all-purpose mixtures have been tested intensively to determine their value in repelling various kinds of insects. Eleven of these mixtures showed greater effectiveness than M-1960 against mosquitoes, fleas, or ticks, and were compared with benzyl benzoate in field tests against chiggers. The composition of these test mixtures is given in table 1.

Evaluations of the repellent mixtures were made by the sleeve technique (Cross and Fye, 1949). Each material was applied in an emulsion to sleeves (2.3 square feet) of cotton herringbone twill cloth at the rate of about 3.6 grams per square foot

TABLE 1.—Percentage Composition of 12 Repellent Mixtures Used as Clothing Treatments. (All Mixtures Contained 10 Percent of Tween 80.)

Mixture No.	Benzyl benzoate	Hendecenoic (undecylenic) acid	*N*-Butyl-acetanilide	*N*-Isopropyl-acetanilide	2-Butyl-2-ethyl-1,3-propanediol	*N*-Butyl-4-cyclohexene-1,2-dicarboximide	*N*-Propyl-acetanilide	Lindane
M-1960	30	—	30	—	30	—	—	—
M-2006	30	—	—	—	30	—	30	—
M-2033	30	—	—	30	30	—	—	—
M-2034	30	—	—	—	30	30	—	—
M-2035	30	30	—	—	30	—	—	—
M-2036	30	—	30	—	—	30	—	—
M-2037	30	30	30	—	—	—	—	—
M-2038	—	—	30	—	30	30	—	—
M-2039	—	30	30	—	30	—	—	—
M-2040	—	30	30	—	—	30	—	—
M-2041	18	18	18	—	18	18	—	—
M-2059	29.7	—	29.7	—	29.7	—	—	1.0

of cloth. After drying, the treated sleeves were attached to the upper arm of human subjects with 2-inch adhensive tape. Exposures were made by placing the hands on the ground for 20 to 40 minutes in an area heavily infested with chiggers. The legs and body were protected with clothing treated with M-1960. One to two hours after exposure the chiggers attached to each arm were counted. In each test untreated sleeves were worn, and the effectiveness of the treatments was calculated from the formula

$$\text{Percent protection} = \frac{\text{Number on check—number on treated sleeves}}{\text{Number on check}} \times 100$$

Sleeves treated with benzyl benzoate at the rate of 2.0 grams per square foot were included as the standard of comparison in all tests.

The sleeves were tested when first treated and after sucessive 10-minute washings, each followed by two 5-minute rinses. Sleeves were not subjected to washing or to further testing when the protection fell below 90 percent. The results obtained are presented in table 2.

TABLE 2.—NUMBER OF WASHINGS WITHSTOOD BY VARIOUS REPELLENTS WHEN TESTED AS SLEEVE TREATMENTS FOR PROTECTION AGAINST CHIGGERS.

Treatment No.	100-Percent protection		90-Percent protection	
	Range	Average	Range	Average
M-2059	3-5	4.0	5-7	6.0
0-523 [1]	2-4	3.3	3-5	4.0
M-2035	1-4	2.7	3-5	4.0
M-2037	1-4	2.7	3-4	3.7
M-2006	1-4	2.3	3-4	3.7
M-2036	1-5	2.7	2-5	3.3
M-2034	1-4	2.3	2-4	2.7
M-2041	1-3	2.3	1-4	2.7
M-1960	1-3	2.0	1-3	2.3
M-2039	0-2	1.0	0-2	1.0
M-2033	0-1	0.3	3	3.0
M-2040	0-1	.3	0-1	0.7
M-2038	0	0	0-2	.7

[1] Benzyl benzoate.

All the mixtures were completely effective when freshly applied to the sleeves, and seven were completely effective after one washing. Mixture M-2059 was the best. It withstood more washings and provided better protection than benzyl benzoate. Mixtures M-2035 and M-2037 were about equal to benzyl benzoate and all three were superior to M-1960. Only four mixtures —M-2039, M-2033, M-2040, and M-2038—were less effective than the standard mixture, M-1960. M-2033 was the only one containing benzyl benzoate that did not give 100-percent protection after one washing.

Tests are now in progress to determine whether any of these mixtures is superior to M-1960 against mosquitoes, fleas, and ticks. As none of the mixtures are commercially available or have been cleared toxicologically for use on civilians, benzyl benzoate and dimethyl phthalate continue to be the recommended repellents for protection against chiggers.

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EXPERIMENTS IN 1952 FOR CONTROL OF THE CITRUS RED MITE

PAUL A. NORMAN and HERBERT SPENCER[1]

In 1952 experiments for control of the citrus red mite *(Paratetranychus citri* [McG.]) were continued in a grove of Temple orange trees at Fort Pierce, Fla. The trees were arranged in 10 blocks with 9 treatments randomized in single-tree plots in each block. The trees had been used in 1949 and 1950 (Spencer and Norman, 1951) and in 1951 (Norman and Spencer, 1952) for earlier experiments.

On February 9, 1952, all trees were sprayed by the owner[2] with a mixture containing 2/3 pound of 40-percent dinitro-*o*-cyclohexylphenol (DN Dry Mix No. 1), 3 pounds each of zinc carbonate and manganese oxide, 10 pounds of wettable sulfur, and 16 pounds of urea (Nugreen) per 100 gallons. The dinitro-*o*-cyclohexylphenol was for the control of the citrus red mite. At postbloom spray time, March 31, a mixture containing 2 pounds of basic copper sulfate, 1 pound of 15-percent wettable parathion, and 10 pounds of wettable sulfur per 100 gallons was applied by the owner to all the trees.

On May 28 a prespray estimate of infestations was made. One unhatched egg or crawling stage was enough to classify a leaf as being infested. On this basis citrus red mite infestations of 20 percent or less require no control. Infestations on leaves and fruits ranged from 76 to 88 percent, but the differences between treatments were not significant, an indication that the 1951 treatments had no influence on the present infestation, and that the dinitro compound applied in February controlled the red mites only until mid-May. The parathion used in the March postbloom spray, together with the basic copper sulfate, may have had a great deal to do with the reappearance of the red mites in heavy infestation during May. Apparently, winter applications of the dinitro compound cannot be depended upon to control red mites through the year on trees that receive copper, zinc, manganese, and/or parathion in winter or in postbloom applications. A summer miticide should be added to the sulfur rust mite spray in June or July for year-around control.

---

[1] United States Department of Agriculture, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine.

[2] Norman G. Platts, cooperator.

Included in the 1952 experiments were EPN, *p*-chlorophenyl *p*-chlorobenzenesulfonate (Ovotran), bis(*p*-chlorophenoxy)-methane (Neotran), Aramite, and malathon. Also included was an emulsive oil prepared by adding 38 ml. of Triton B-1956 (a glycerol phthalic alkyd resin) emulsifier per gallon to a standard spray oil having a viscosity of 114 seconds Saybolt at 100° F. and an unsulfonatable residue (A.O.A.C.) of 73.5 percent.

In most of the tests these miticides were used in combination with wettable sulfur and/or parathion. In one treatment only the last two materials were used. Wettable sulfur was included for control of the citrus rust mite *(Phyllocoptruta oleivora* [Ashm.]) and parathion for the purple scale *(Lepidosaphes beckii* [Newm.]). The sprays were applied on June 4 and postspray estimates of infestation by the citrus red mite were taken on July 11. The materials used and the results are shown in table 1.

TABLE. 1.—CONTROL OF CITRUS RED MITES ON TEMPLE ORANGE TREES WITH COMBINATION SPRAYS CONTAINING VARIOUS MITICIDES. 1952.

Materials (quantities per 100 gallons)	Percent of leaves infested	
	Prespray	Postspray
Emulsive oil 1 gal.	76	1.3
Emulsive oil ½ gal., parathion (15% WP) 1 lb.	85	1.0
EPN (27% WP) 1 lb., parathion (15% WP) 1 lb., wettable sulfur 5 lb.	87	.3
p-Chlorophenyl *p*-chlorobenzenesulfonate (50% WP) 1 lb., parathion (15% WP) 1 lb., wettable sulfur 5 lb.	87	.6
bis(*p*-Chlorophenoxy)methane (40% WP) 1½ lb., parathion (15% WP) 1 lb., wettable sulfur 5 lb.	87	2.6
Aramite (57% Em) ½ pt., parathion (15% WP) 1 lb., wettable sulfur 5 lb.	85	4.0
Malathon (25% WP) 2½ lb., wettable sulfur 5 lb.	87	1.6
Malathon (50% Em) 1 qt., wettable sulfur 5 lb.	82	2.6
Parathion 1 lb., wettable sulfur 5 lb.	88	5.0
Difference required for significance:		
at 5% level	nsd	3.3
at 1% level	nsd	4.3

In contrast to 1951, when 9.88 inches of rain followed the first experimental sprayings, the rainfall of 1.56 inches during June and 2.36 inches during the first 11 days of July of 1952 was lower than average and the miticide residues remained on the trees longer. For this reason control with the wettable miticides was very much better and differences between materials were not so marked. Although the natural infestations were probably on the decline, infestations were still heavy on adjacent untreated trees early in July.

All the experimental sprays gave excellent reduction of heavy initial infestations, although the spray containing parathion without any of the newer miticides gave significantly less reduction than the other combinations.

The 1952 results indicate that, for summer control of the citrus red mite, one of the following miticides might be added to the rust mite and scale spray of wettable sulfur and parathion: *p*-chlorophenyl *p*-chlorobenzenesulfonate, bis(*p*-chlorophenoxy)-methane, or EPN. The spray containing Aramite was slightly inferior to the others. Malathon added to wettable sulfur gave promising results. Emulsive oil, either alone or with parathion, also gave good reduction of heavy red mite infestations.

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UNUSUAL ABUNDANCE OF THE TREE-HOPPER UMBONIA CRASSICORNIS A & S

F. Gray Butcher
University of Miami, Coral Gables, Florida

In the early fall of 1951 numerous reports were received of heavy infestations of a "thorn bug" from Miami home owners. The designation "thorn bug" accurately described the insect associated with complaints from barefoot children playing under infested trees, as the sharp pronotal processes of the insects could be most uncomfortable.

Figure 1. Nymphs of *Umbonia crassicornis* A & S clustered on twig of pithecellobium; empty egg mass on right.

My first specimens of these insects were obtained in April, 1951. They were submitted to entomologists at the University of Kansas, where Dr. P. B. Lawson and Paul Cook identified them as *Umbonia crassicornis* Amyot and Serville. They advised that this membracid has been known from Florida for some time, and it has been reported as frequently seen in Mexico, Central and South America.

Investigation of numerous home-owner complaints revealed these tree-hoppers developing in immense numbers on various leguminous and related host plants. *Pithecellobium dulce* was a favorite host, and terminal twigs and smaller branches of this tree would frequently be entirely covered with nymphs and adult insects. Clusters of such infestations are illustrated in figure 1. Certain other plants were almost as heavily infested, including *Cassia* sp. and wild tamarind *(Lysiloma bahaminensis)*, with lighter infestations commonly observed on calliandra *(Calliandra surinamensis)*, tamarind *(Tamarindus indica)* and woman's tongue *(Albezzia lebbek)*. An unusual host record was the nymphal development of the insect on *Casuarina* sp., reported independently by Dr. H. F. Strohecker of the Zoology Department and Mr. Seymour Goldweber of the Experimental Farm staff, University of Miami. The adult tree-hoppers were observed on many other trees and shrubs, but nymphal development seemed to be limited to the above named plants.

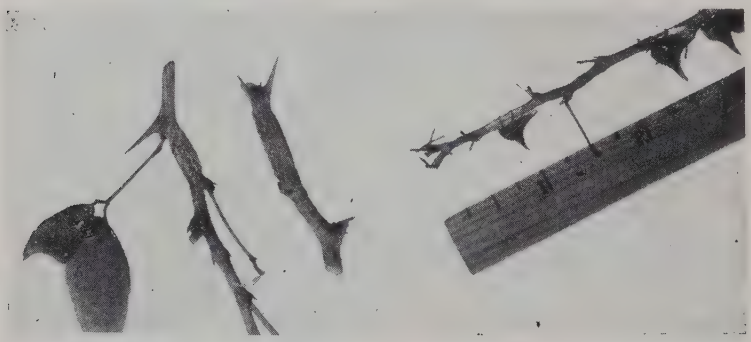

Figure 2. Egg masses of *Umbonia crassicornis* A & S with attendant females in normal position shown in illustration on the right.

Development of the insects was confined to the woody portion of the hosts. The eggs are deposited in small masses just under the tender bark of the twigs (see fig. 2). Observations of light infestations revealed that the egg-laying female remains with the egg mass throughout the ten to twelve day incubation period. Five nymphal instars were recognized.

Heavy infestations of this insect continued to be common during the winter and early spring. By mid-June their numbers had materially decreased. W. G. Genung reported *(in* U.S.D.A. Cooperative Economic Insect Report 2: 244, 1952) that infestations were continuing in Palm Beach County up to

August 15, 1952, but with lighter populations than in previous weeks. Dr. D. O. Wolfenbarger of the Homestead Sub-station has recently advised that the species appears to be increasing in numbers in that area at the present time.

The heavy infestations of these sucking insects caused serious injury to many trees; however, the surprising thing was that the injury was not more severe. Many host trees carried heavy infestations for long periods of time without indication of any extensive damage. Some trees, especially some Cassias, suffered considerable loss of foliage. The pitchecellobiums suffered rather general and extensive terminal twig death, but permanent loss of even small trees has not been observed.

Home owners found the insects a considerable nuisance, with the fairly extensive honey-dew secretions and accompanying sooty mold development. They found the infestations rather difficult to control. Sprays with various chlorinated hydrocarbons gave disappointing results, although they generally reduced infestations materially. Most effective control was reported from the use of nicotine sulfate, parathion or TEPP.

Parasites and predators of these tree-hoppers have been conspicuous by their absence. A single case of predatism was observed. Specimens of the pentatomid involved were collected by Mr. C. A. Bass, and identified by G. B. Merrill of the State Plant Board as *Euthyrhynchus floridanus* (L.).

One other instance of a similar outbreak of this species has been recorded by F. W. Gooding, occurring in 1921 in the Canal Zone (Jour. New York Ent. Soc. 38: 47, 1930). He described the insects as "infesting various shrubs and trees in countless numbers in the vicinity of Panama, with very injurious effect". He did not designate specific host plants being attacked.

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TWO NEW NEOTROPICAL SAICINAE (REDUVIIDAE, HEMIPTERA)

Roland F. Hussey
Florida Southern College, Lakeland

These new species are based on specimens in the collection of the Museum of Zoology of the University of Michigan. I am greatly indebted to Doctors J. Speed Rogers, Director, and Theodore H. Hubbell, Curator of Insects, for the privilege of studying the Reduviidae of that collection during the summer of 1952; and my thanks are due also to Doctor R. I. Sailer, of the U. S. National Museum, and to Mr. Joe C. Elkins, of Dallas, Texas, for comparative notes on other species related to these and for certain of the sketches that are reproduced herewith. As in other papers now in press, I have converted all micrometer measurements into hundredths of a millimeter so that actual lengths (or widths) can easily be read directly from any ratios given here.

Oncerotrachelus spiniventris, n. sp.

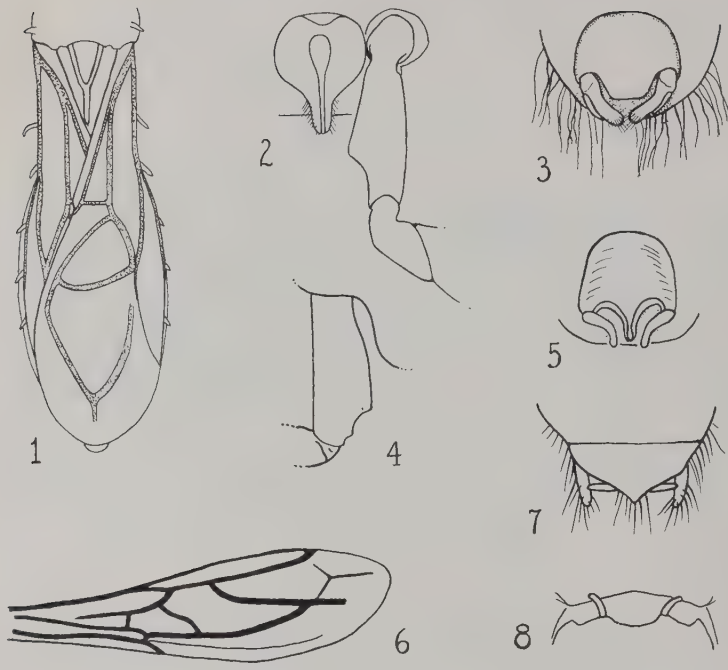
Figs. 1-3

Male: Length 7.0 mm.; width of pronotum 1.3 mm., of abdomen 1.75 mm., the abdomen scarcely wider than the hemelytra.

Strongly shining, rather thickly long pilose on many parts of the body, especially the antennae (last two segments excepted), legs, pronotum, sides of head behind the eyes, costal margin and veins of corium and clavus, abdominal margins, and scutellum including the apical spine; venter with semi-prostrate pilosity; prosternal xyphus more shortly pilose on its margins and on the edges of the rostral groove; mesosternum pilose along the anterior half of the median line.

Color rather deep brown above, the extreme tip of the head yellowish, the globose posterior lobe of the head piceous; median longitudinal sulcus of pronotum faintly paler than the disk, the lateral borders distinctly paler, becoming flavo-testaceous on the humeral elevations and their spines; scutellar spine, costal margin of hemelytra, and connexivum above flavo-testaceous. Legs testaceous, the tips of the coxae, trochanters entirely, bases of femora, all tarsi and the apical portion of the tibiae flavous; pleura brown; ventral segments flavous, irregularly clouded with brownish.

Head porrect, about as long as the pronotum (118:115), more than one-fourth longer than its width across the eyes (118:93); eyes large, prominent, globose, coarsely facetted, each eye two-fifths wider than the interocular width of the vertex (35:25) and about as wide as long (35:37) in dorsal view; anteocular length to extreme tip of head subequal to the postocular length (40:38); transverse impression of the vertex lying distinctly in front of the hind margin of the eyes; lateral margin of the head (seen from above) not incised between the eye and the globose posterior lobe.



Figs. 1-3, *Oncerotrachelus spiniventris*, n. sp.—Fig. 1, Posterior part of body in dorsal aspect, showing venational pattern and spines of connexivum and pronotum. Fig. 2, Prosternal xyphus and left coxa, ventral aspect, the coxa rotated outward so that the median face is exposed. Fig. 3, Male hypopygium and claspers, ventral aspect.

Figs. 4-5, *Oncerotrachelus conformis* Uhler.—Fig. 4, Front coxa, lateral aspect (redrawn after a sketch by R. I. Sailer made from a cotype). Fig. 5, Male hypopygium and claspers, ventral aspect (redrawn after a sketch by Joe C. Elkins from a specimen coll. by H. H. Smith at Balthazar, Grenada, B. W. I.).

Figs. 6-8, *Saica subinermis*, n. sp.—Fig. 6, Right hemelytron, showing venational pattern. Fig. 7, Apex of abdomen, ♂, dorsal aspect (pilosity omitted on part of postero-lateral margins). Fig. 8, Apex of abdomen, ♂, posterior aspect (claspers omitted).

Antennae nearly as long as the body, their total length 6.6 mm.; lengths of segments I-IV = 238:163:133:123, the first segment very little longer than the head and pronotum combined (238:231), many of the hairs on the first segment four times, on the second segment twice as long as the thickness of the respective joints. First rostral segment attaining the middle of the postocular part of the head, nearly one-fifth longer than the second and third joints together; lengths of the rostral segments 83:25:35, measured on the upper side.

Pronotum about one-sixth wider than long (133:115), the anterior lobe strongly bigibbous, its lateral margins depressed between the gibbosites above and the tumid acetabula below and there provided with a low carina which ends above the obsoletely nodose anterior pronotal angles. Humeri lightly longitudinally elevated, each with a nearly vertical spine which is almost as long as the maximum thickness of the front femur (23:25). Median longitudinal sulcus not reaching the hind margin, parallel-sided on the posterior lobe where it is transversely rugulose, somewhat widened at the middle of the anterior lobe. Scutellum long triangular, its margins thick and elevated above the discal impression; apical spine long, oblique at the base, rather abruptly recurved upward at about the apical fourth of its length, its total length about-thirds that of the front coxa.

Prosternal xyphus (Fig. 2) about one-half longer than wide (68:45), its anterior edge broadly angularly emarginate, the posterior margin produced as a ligulate process comprising about one-third of the total length of the xyphus; rostral groove widened on the center of the disk, not reaching the anterior edge of the xyphus but attaining the apex of the posterior process, the latter reaching the middle of the front coxae. Front coxa angulate on its inner dorsal edge (Fig. 2) at about its distal third. Hairs on all femora and tibiae at least as long as the thickness of their respective joints, often longer. Hind femora slightly surpassing the apex of the abdomen.

Dorso-lateral spine of first tergite horizontal, one-half longer than the thickness of the front femur, sometimes curved at the tip; connexival segments each with a distinct, more or less erect spine (Fig. 1), these spines longer and more cylindrical on the anterior segments, nearly or quite as long as the thickness of the hind femur, the spines on the posterior segments becoming shorter and more conical. Posterior margin of the hypopygium (Fig. 3) as seen from below transversely truncate between the claspers at or slightly before the middle of their length, not produced as a median spiniform process; claspers rather thick, concave inwardly, their tips finely pilose.

HOLOTYPE, ♂: PANAMA, Chiriquí Province, Progreso, 17-V-1923 (F. M. Gaige).

This species is closely related to the Antillean *O. conformis* Uhler, with which it agrees in the structure of the pronotal sulcus, the presence of spines at the humeral angles, and the spinose connexivum. This last character was not mentioned in Uhler's description, but Dr. Sailer writes me that a cotype of *O. conformis* in the U. S. National Museum has connexival spines similar to those of the present species though much shorter, the first pair being only 0.07 mm. long while in *O. spiniventris* these first spines measure 0.18 mm. Also, Dr. Sailer writes that the first antennal segment of this cotype is exactly as long as the head and pronotum combined, and thus is somewhat shorter than stated by Uhler.

The much larger size and the genital characters make *O. spiniventris* clearly distinct from *O. conformis*, and the form and position of the notch on the front coxa appear to be different. For comparison, figures are given of the fore coxa (Fig. 4) and the genital capsule (Fig. 5) of *O. conformis*, redrawn respectively from sketches by Dr. Sailer and by Mr. Elkins.

Saica subinermis, n. sp.
Figs. 6-8

MALE: Length 9.0 to 9.4 mm.; width of pronotum 1.5 to 1.6 mm.

Testaceous, more or less suffused with reddish on the head, pronotum (especially the posterior lobe toward the sides) and the stigma of the hemelytra; legs very pale reddish, the fore and middle trochanters and the bases of the middle and hind femora flavo-testaceous; veins of the corium stramineous, the cells very lightly infuscated (except immediately adjacent to the veins), apical half of the anal margin faintly paler, as also the area between cubital and anal veins as far as the cross-vein joining them. Legs with very fine golden pubescence, this forming more or less evident longitudinal bands on the basal half or more of the middle and hind tibiae; fore femora with a row of rather irregularly spaced short setae on the anterior face and with a row of much longer and more widely spaced hairs on the antero-ventral side. Posterior lobe of pronotum with minute pale pubescence (best seen from the side) and with some suberect longer hairs; second rostral segment with a conspicuous tuft of about six setae on each side above. Antennae flavo-testaceous, the first two joints rather thickly set with short oblique hairs. All spines flavous, their extreme tips piceous.

Head (excluding the short neck) as long as the anterior lobe of the pronotum and slightly longer than its own width across the eyes (88:83), the vertex flat before the transverse postocular impression, the postocular part gibbous, one-fourth shorter than the part lying before the transverse impression. Lengths of antennal segments I-IV = 305:128:195:170, the first segment about as long as the distance from the tip of the antenniferous tubercle to the apex of the scutellum.

Pronotum about as wide as long (155:150), the anterior lobe nearly one-half longer than the posterior lobe (88:67), bigibbous behind and broadly depressed between the gibbosities, the outer side of the latter with two oblique bands of pilosity, the median portion glabrous except narrowly along the middle line; anterior angles nodose, very lightly elevated; antero-ventral spines of the prothorax (seen from the side) broadly triangular, the tips acute. Humeral spines extremely short, conical, acute, scarcely one-half longer than their thickness at the base, directed outward and upward; scutellar spine rather thick, hardly longer than the scutellum itself, somewhat oblique at the base, recurved upward toward the acute tip; spine of first tergite vertical, nearly twice as long as the humeral spines (25:13), its extreme tip recurved backward. Metanotal process longitudinally impressed along the middle, its apex plainly emarginate.

Hemelytra (Fig. 6) with two closed cells and with two which are nearly closed, one of these lying proximad and the other distad of the closed cells,

the proximal one long triangular in shape and open at its proximal end owing to the obsolecence of the basal portion of the medial vein, the other one much larger, its outer side adjacent to the stigma for more than half the length of the latter, almost closed distally by a Y-shaped conformation of rather weak veins, the outer arm of which does not quite meet the radial vein near the apex of the stigma. Hind femora surpassing the apex of the abdomen, attaining the tips of the hemelytra.

Eighth tergite of the male transversely rugulose, its postero-lateral margins (Fig. 7) as seen from above convex basally and lightly concave toward the apex, meeting at nearly a right angle on the middle line; claspers digitiform, three times as long as thick (43:14), bluntly rounded at the tips. Spines of the hypopygial margin (Fig. 8) widely separated, strongly flattened, ligulate, directed obliquely upward and outward at the base and suddenly lightly decurved at about the middle, the tips roundly subtruncate.

HOLOTYPE, ♂, and two ♂ *paratypes:* MEXICO, State of Michoacán, 12 miles south of Tzitzio on the road to Huétamo, elevation 1050 meters, 10-VII-1947, taken at lighted sheet (T. H. Hubbell); one of the paratypes is in my collection. A fourth specimen taken with the others lacks the abdomen and is therefore not made a paratype.

This species seems most nearly related to *Saica tibialis* Stål and *S. erubescens* Champion. It is slightly smaller than the former, and is at once distinct from these and other species of the genus by reason of the extremely short humeral spines.

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A NEW CORIXID FROM MISSISSIPPI (HEMIPTERA: CORIXIDAE)

C. A. WILSON
Department of Zoology and Entomology
Mississippi State College

This beautifully marked corixid was collected by the writer from the cool waters of a deep slough in a swamp near Burnsville in northeastern Mississippi. The specimens were captured by immersing the net to a depth of about three feet and sweeping it through the water rapidly.

. **Sigara (Pediosigara) saileri** new species

Plate 1: figures 1, 2, 3 and 4

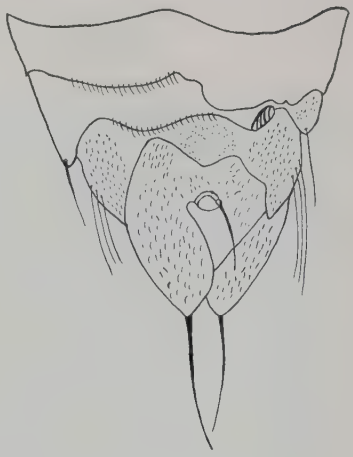
SIZE: ♂ Length, 6.05-6.15 mm.; width across eyes, 1.75-1.83 mm. ♀ Length, 6.17-7.18 mm.; width across eyes, 1.87-2.05 mm.

COLOR: General facies black, punctuated with irregular lemon-yellow markings. Pronotum with 5 or 6 transverse yellow bands, alternated with 5 black bands; all the transverse pronotal bands interrupted by a mid-dorsal longitudinal pale stripe. Clavus, corium and membrane black with irregular pale markings along sultures and margins, and with scattered, irregular pale colored punctuations. Head light orange-yellow; embolium smoky-white.

STRUCTURAL CHARACTERISTICS: Head approximately one-third shorter than length of pronotal disk; vertex broadly rounded anteriorly; width of interocular space one-third less than the width of an eye; fovea of male shallowly concave. Pronotum subequally twice as wide as long, with a fairly distinct median longitudinal carina anteriorly; pronotum rugulose, hemelytra very faintly rugulose. Pruinose area of embolar groove posterior to nodal furrow slightly longer than the pruinose area of the claval suture. Lateral lobe of prothorax one-fourth longer than wide, rounded at tip. Metaxyphus pointed apically, about one-third wider than long. Front leg of female normally shaped with approximately 20 hairs in lower palmar row and 28 hairs in upper palmar row of pala. Front leg of male: pala somewhat rectangular shaped, rounded on apical portion of dorsal margin; peg row originating centrally on pala and gradually extending toward dorsal margin apically, curved downward at tip, and containing about 23 pegs of variable size, those at ends more pointed; apical portion of dorsal margin with four or five evenly spaced long hairs. Tibia rectangular, curved and about three-fifths as long as pala, femur robust, pilose on basal, dorsal area. Middle and hind legs slender, middle femur with a few minute, scattered spines; middle tibia subequal in length to tarsal claw; hind femur subequally as long as tibia; hind tarsus with segment one a little more than twice as long as segment two. Male asymmetry dextral; strigil small, pea-shaped and containing 5 combs.

COMPARATIVE NOTES: This species can be easily separated from the related species, *Sigara (Pediosigara) hydatotrephes* (Kirkaldy), by the distinctive punctuations in the color pattern of the hemelytra, the number

1



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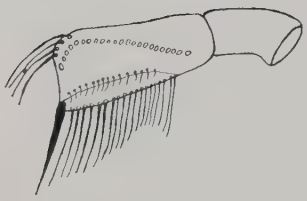

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4

Figure 1. Dorsal view male; *Sigara (Pediosigara) saileri* new species.

Figure 2. Dorsal view of male abdomen; *Sigara (Pediosigara) saileri* new species.

Figure 3. Pala of male; *Sigara (Pediosigara) saileri* new species.

Figure 4. Genital capsule of male; *Sigara (Pediosigara) saileri* new species.

and arrangement of the pegs on the pala of the male and the shape and appearance of the dorsal abdominal segments of the male.

LOCATION OF TYPES: Holotype male, allotype female and paratypes in the Francis Huntington Snow Collections, University of Kansas. Paratypes in the United States National Museum, Washington, D. C., the Mississippi State College collections and the collection of the author. Type locality, Burnsville, Mississippi.

LOCALITY DATA: Burnsville, November 1949, 6 males and 16 females, collected by the author.

This interesting and strikingly marked species is named in honor of Dr. Reece I. Sailer who first suspected that it might be new to science. The author wishes to thank Dr. H. B. Hungerford for his kindness in checking the description and drawings.

REFERENCE

Hungerford, H. B. 1948. The corixidae of the western hemisphere (Hemiptera). Univ. of Kan. Sci. Bull., 32: 638-640.

CITRUS GROWERS

NEMATODES MAKE THIS DIFFERENCE

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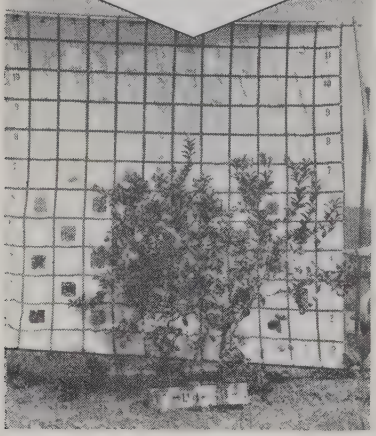
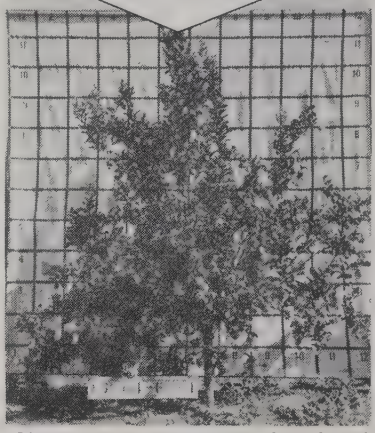


Lemon tree (below) grown in D-D treated soil will grow to be heavy producer . . . because healthy root system is free of nematodes.



Photos courtesy of F. V. Foote, Limoneira Company, Santa Paula, California

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ON A FLORIDA MILLIPED, SIPHONOTUS MIAMIENSIS, N. SP. (COLOBOGNATHA: POLYZONIIDAE)

Nell B. Causey
Fayetteville, Arkansas

This is the first species of the widely distributed genus *Siphonotus* to be found in the United States. It brings to two the number of species of the order Colobognatha that are known to be in Florida, *Andrognathus corticarius* Cope 1869 having been collected at Quincy (Loomis, 1936). Careful searching in damp humus should yield other representatives of the order, however.

I am indebted to Dr. Milton W. Sanderson of the Illinois Natural History Survey for the opportunity of studying this interesting milliped. The holotype is in the permanent collection of the Illinois Natural History Survey, Urbana, Illinois.

Siphonotus miamiensis, n. sp.

Figures 1 and 2

Distinguished from the West Indian species *S. purpureus* Pocock 1894, in which the tergites are smooth and polished and apparently free of setae, by the presence of two transverse rows of setae on the metatergites.

Male Holotype: Color of dorsum in preservative areolated medium brown; the spots are arranged to form a wide, medial, light, longitudinal band with a narrow, dark band and a narrow, light band on either side of it. A narrow, curved brown line crosses each metazonite near the caudal margin. Antennae violaceous brown, with a narrow brown line around the base of each. Snout, venter, and legs nearly white.

Body long and narrow. Dorsum strongly arched. Prozonites of the first few segments slightly depressed below the metazonites. Dorsal margin of head straight in lateral profile, the length of the exposed part slightly longer than the collum; snout pointed. Antennae typical of the genus, i. e., not clavate, the sixth segment longest, and the seventh segment not completely telescoped within the sixth. Caudal margin of penult segment straight and about twice the width of the last segment. Anal valves do not project beyond the caudal margin of the last segment. Collum and dorsal surface of head evenly but not thickly setose; on the remaining segments, except the last, there are two transverse rows of setae, one near the hind margin and the other at about the middle of the metatergites. Repugnatorial pores of the fifth segment nearer the lateral than the caudal margin; on all other poriferous segments, the pores are nearer the caudal than the lateral margin. All pores are approximately the same size.

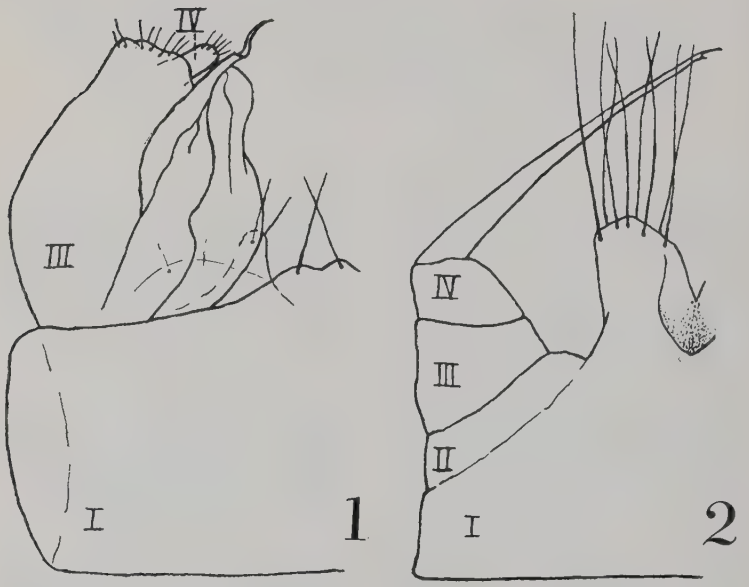

Figure 1. Right anterior gonopod, caudal view.
Figure 2. Right posterior gonopod, caudal view.

Each gonopod consists of four segments, with the basal segments in both pairs large and coalesced, forming syncoxae (Figs. 1, 2. I). The anterior syncoxa has two pairs of small, medial lobes, each with one or two setae, and the posterior syncoxa has one pair of large, medial lobes, each with several long setae. Each anterior telopodite (Fig. 1) consists of a norrow basal segment visible only from the cephalic surface, a large, globose segment (III), and a minute, terminal segment (IV). A chitinized ridge on the caudal surface of the third segment projects as a twisted, aciculate process. Each posterior telopodite (Fig. 2) consists of three segments and a long, terminal spine.

Length about 7 mm., *width* 0.5 mm., 40 segments.

TYPE LOCALITY: Miami, Florida. Holotype and a mature male paratype of 35 segments collected April 1, 1951, by John E. Porter, Acc. No., 49712, Illinois Natural History Survey.

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Loomis, H. F. 1936. Three new millipeds of the order Colobognatha from Tennessee, Texas, and Lower California, with records of previously known species. Proc. Unitd States Nat. Mus. 83(2989):361-368, fig. 32.

C. S. RAFINESQUE AS THE REAL FATHER OF AMERICAN MYRIAPODOLOGY: AN ANALYSIS OF HIS HITHERTO UNRECOGNIZED SPECIES

Richard L. Hoffman and Ralph E. Crabill, Jr.

Among the ranks of hardy naturalists who represent the true pioneers of American zoology, perhaps the most outstanding is the remarkable scientific waif, Constantin Samuel Rafinesque-Schmaltz. Few other workers have been so versatile, industrious, and sincere; probably none has been subjected to such abuse and ridicule by both contemporaries and successors. Manifold as were his activities, Rafinesque was at heart a taxonomist; his views on the value of systematic investigations, so eloquently presented in the introduction to his *Annals of Nature,* might be read with appreciation and sympathy by many of the current defenders of "pure science" in biological studies. His knowledge of the American flora and fauna was gained first-hand through extensive and arduous travels. We can never cease to lament the loss of most of his collections.

Many of Rafinesque's contemporaries, well-bred gentlemen with whom zoology was little more than a pleasant diversion, were often disposed to overlook or discredit the work of the eccentric, socially indifferent naturalist, and up to the present time more than a few workers have sought to deal with Rafinesque's briefly disagnosed species by the simple expedient of declaring them to be unidentifiable. Yet it is becoming increasingly evident that his work may *not* be disregarded! Considering the conditions under which he lived and worked, and the diversity of subjects which engaged his attention, one is inclined to wonder that he did so well!

Despite the numerous species described by Rafinesque in almost every animal group, he has traditionally been credited with but a single myriapod species—*Selista forceps.* Also by tradition, fallacious in this as in most other cases, Thomas Say has been regarded as the first American worker to describe a considerable number of chilopods and diplopods. The error in this instance may be attributed to our predecessors in the study of these animals, among whom Horatio C. Wood and Lucien M. Underwood may be held particularly culpable. Both of these individuals had access to Rafinesque's 1820 work, *The Annals*

of Nature, and noted the description of *Selista forceps* on page 7. But by the most consumate carelessness, they failed to recognize that the seven genera and eleven species immediately following *forceps* are clearly myriapodous! Relying on the authority of Underwood's erroneous statement in 1893 (Bull. U. S. Nat. Mus., 43: p. 9), no subsequent worker has ever re-examined the *Annals* with respect to myriapod species.

It is, therefore, a matter of some interest to resurrect these long-neglected names, and to ascertain as far as possible their identity in terms of currently known species. Their rediscovery came about, it might be added, by a most fortuituous circumstance, in that one of us (Hoffman) happened to be glancing through a copy of the *Annals* in connection with quite a different subject, when his eye was caught by the italicized word *"Polydesmus"* appearing in the diagnosis of the genus *Cryptomera*. Immediate close scrutiny ensued, bringing the realization that most of the species appeared to be recognizable. Considering the generally unwarranted rejection of Rafinesque's works, and disregard of his pioneering efforts, we are somewhat gratified at being able to bring his myriapods to the attention of other workers, and, incidentally, to restore him to his rightful position as the father of American myriapodology. What Rafinesque says about *Narceus tinctorius* and *Mycotheres vittata* makes more sense than some descriptions of millipeds and centipeds which have been published within the past few years! His descriptions, considering the standards of the time, generally equal or surpass those published by Brandt, Gray, Leach, Newport, even the revered Say. Many zoologists may deplore this defense of one who has been regarded with such ill-esteem. Yet we believe that the descriptions, carefully studied, will speak for themselves. Compare Rafinesque's type localities, usually given with some accuracy, with those generally cited by his contemporaries, who felt that mention of a state was adequate.

A certain amount of allowance must be made for errors of detail. Numbers cited for antennal and leg joints are often incorrect, but such lapses, attributable to the poor lens available to Rafinesque, are not entirely absent from current literature.

We have adopted the scheme of presenting first the original Rafinesquean description, following it, under special heading, with our interpretations. It should be understood that responsibility for the chilopod section lies entirely with Crabill; that for the diplopods with Hoffman, although the general plan of

this paper was worked out jointly. A summary of genotypical considerations is suffixed to each section.

Quoted descriptive material is given *verbatim* from the *Annals,* including all of the orginal errors and omissions.

CHILOPODA

"VI. N. G. SELISTA. Body depressed, with nine segments, including the head and tail. Head large; forehead notched, ending in a large curved forceps with a tooth inside. Two palps as long as the forceps, with two articles and two claws at the end. Eyes lateral round; antenna inserted before the eyes, as long as the frontal forceps, with two long segments and two terminal threads. Fourteen lateral legs, with two articles and two claws besides, or bifid at the end.—A very singular genus of the family *Myriapoda,* and sub-family *Scolopendria.* The name was that of a nymph.

"42. *Selista forceps.* Fulvous brown, frontal forceps as long as the head, tail bidentated.—Found near Baltimore by Mr. H. Hayden. It comes into the houses, length one inch."

PRESENT INTERPRETATION. This name is a junior synonym of *Scutigera coleoptrata* (Linne), 1758, a well-known European centipede that was evidently introduced into this country in colonial times and that has since spread throughout the settled regions of the United States. Although Chamberlin was unable to distinguish between French and North American specimens in 1920 [1] and consequently concluded that the valid name must be *coleoptrata,* the Rafinesquean *forceps* continues to appear in the literature.

"VII. N. G. CRYPTOMERA. Body depressed, linear, narrow, with many segments, each with one pair of lateral filiform legs with four articles; alternate segments shorter and almost entirely covered and concealed by the larger ones. Head truncate; eyes obsolete; two long filiform multi-articulated nearly lateral, and distant antenna; no visible palps.—It belongs to the family *Myriapoda,* sub-family *Chilognathia,* next to the genus *Polydesmus.* The name means concealed parts.

"43. *Cryptomera lunularis.* Reddish brown; sixteen pairs of legs, the last pair longer; antenna one-third of total length; sides straight, tail short, lunulate; length about one inch.—Found near Baltimore and Philadelphia on the ground: segments as long than broad."

PRESENT INTERPRETATION. Mention of the alternate segments *(i.e.* tergites) which largely cover and conceal the smaller segments and of sixteen pairs of legs [2] suggests that *lunularis*

[1] Ann. Ent. Soc. Amer., XIII, pp. 283-301, 1920.

[2] Rafinesque frequently erred in citing numbers of leg-pairs, probably partially because of his poor magnifying equipment. In the case of *lunularis* I assume he miscounted by one, for the number should be fifteen; not sixteen. He often called the ultimate legs "filaments"; therefore, by ultimate legs we understand *penultimate* appendages. A miscount of the number of leg-pairs accompanies each of his descriptions save, perhaps, that of *Mycotheres oligopoda.*

is either a Lithobimorph or a Scutigeromorph. The rather short antennae (one-third the body's length), the reddish-brown color, and the presence of the centipede near Baltimore and Philadelphia *on the ground* point to the former order. Only three Anamorpha about an inch long are known from the region; these are *Bothropolys multidentatus* (Newport), 1844, *Lithobius forficatus* (Linne), 1758, and *Scutigera coleoptrata* (Linne), 1758. If we assume *lunularis* to be a Lithobiomorph, the reddish-brown color and the length of the antennae seem more characteristic of *multidentatus* than of *forficatus*. On the other hand, the generic diagnosis is more suggestive of *Scutigera coleoptrata* owing to the extensive and concealing segments *(i.e.,* tergites) that he mentions. I do not feel that we can rule out *coleoptrata;* the rather short antennae and ultimate legs could be explained by their having been broken off, certainly a common enough phenomenon that could be detected with difficulty even with an adequate lens. Since the identity of *lunularis* appears to me to be controversial, I shall consider it *species inquirenda.*

"44. *Cryptomera nemura.* Brown; fourteen pairs of legs, the posterior pairs very long; antenna nearly as long as the body, large segments gibbose, rounded, scutiform, sides notched; tail having two filaments as long as the body; length over one inch.—Found by Mr. Hayden in the cellars of Baltimore: segments longer than broad."

PRESENT INTERPRETATION. The very long antennae and ultimate legs together with the fourteen (correctly fifteen) pairs of legs identify this species as *Scutigera coleoptrata* (Linne). Its habitat, "the cellars of Baltimore", further strengthens this contention. This form is surely the common house centipede; consequently *Cryptomera nemura* should be considered a junior synonym of the Linnaean name.

"VIII. N. G. STENOMERA. Differs from *Cryptomera* by narrow segments visible not covered; the first segment is a narrow one; head oval, antennae setaceous, thick and approximated at the base.—Very near to *Cryptomera:* the name means narrow parts.

"45. *Stenomera interrupta.* Antenna twice the length of the head; fourteen pairs of legs, the posterior ones longer and thicker; sides deeply notched, tail bidentate.—I have found it near Hadley's falls (in 1816) on the Hudson river, on mushrooms, upon which it feeds probably. Length one and an half inches; colour pale brown; many of the large segments are slightly lunulate behind, all are broader than long."

PRESENT INTERPRETATION. The number of legs, the length of the antenna (twice that of the head), and the total length of the animal strongly suggest but one eastern species presently

known from the typical region; this is *Lithobius forficatus* (Linne). The length of the antennae of *Bothropolys multidentatus* (Newport) is more on the order of three times the length of the head. Also, I have never heard of nor seen a specimen of the latter form that measured much more than an inch, whereas aged *forficatus* individuals frequently exceed an inch and a quarter in length. I believe that *interrupta* is a junior synonym of *Lithobius forficatus.*

"IX. N. G. MYCOTHERES. Differs from *Cryptomera* by all the segments equal and apparent, and head of various shapes, eyes lateral when visible, &c.—This genus differs from *Julus* by having only one pair of legs to each segment. The name implies feeding on mushrooms, as most of the species do. There are many of them in the United States. I shall merely mention three at present.

"46. *Mycotheres Oligopoda.* Antenna one-third of total length, bent outwards; head rounded; body attenuated behind; seven pairs of equal legs; tail bifid.—Found on the Luzerne mountains of New York, near Glen's falls. Length one fourth of an inch, colour fulvous. It may be the type of a subgenus, *Exocera.*"

PRESENT INTERPRETATION. The short antennae, seven pairs of legs, and its diminutive size identify *oligopoda* as an immature Lithobiomorph, probably in the first *pullus* instar. The lack of additional signficant morphological details, together with the fact that numerous small Lithobiomorphous species are known to inhabit New York state, preclude even a good guess as to the animal's identity. The form must be designated *species inquirenda.*

"47. *Mycotheres leucopoda.* Antenna straight, one-fifth of total length; head truncate body linear, fulvous, about twenty pairs of white legs, the posterior ones rather longer; tail bisetose. Found in the knobs of Kent'y. Length less than 1 inch."

PRESENT INTERPRETATION. The reference to twenty pairs of legs, which is sufficiently close to the correct figure, twenty-one, identifies *leucopoda* as a Cryptopid Scolopendromorph. The name is undoubtedly referable to one of the following three species, the first two of which are now known to inhabit Kentucky: *Cryptops hyalinus* Say, 1821, *Theatops posticus* (Say), 1821; *Theatops spinicaudus* (Wood), 1862. The last two of these would seem to be eliminated because the ultimate pedal segment of each is conspicuously much longer than the segment preceding, whereas the generic diagnosis of *Mycotheres* clearly specifies that all of the segments are equal. I believe this striking feature would not have escaped Rafinesque. This leaves *Cryptops hyalinus* Say, a fulvous-colored, inch long centipede

whose legs are rather pale. Moreover, the study of numerous collections of Kentucky centipedes that I have received during the past four years indicates that *hyalinus* is probably the most commonly encountered Chilopod of the state. I believe the evidence is sufficient to justify our viewing *leucopodus* as the senior synonym of the well-known Say name, *hyalinus*.

"48. *Mycotheres vittata*. Fulvous, a longitudinal brown streak on the back; antenna moniliform, longer than the head; about fifty pairs of legs, almost equal; tail elongate obtuse, with a lateral setaceous appendage on each side; head oval, pandurate, obtuse; eyes lateral, visible, round.—A fine species about two inches long and one-twelfth broad. It may form a sub-genus *Nemopleura*. Found in the highlands of New York. The antenna have about fifteen rounded articles. Eyes black, almost inferior. The head and tail are not streaked."

PRESENT INTERPRETATION. Rafinesque's description of *vittata's* fulvous body, which is marked dorsally by a longitudinal brown streak and which bears "about fifty pairs of legs", can refer only to one known eastern Geophilomorph, the handsome and ubiquitous *Geophilus rubens* Say, 1821. Objection might be raised to this interpretation because of his reference to its black, lateral, and almost inferior eyes (all known Geophilomorpha are eyeless). This may be resolved, however, if we take his evidently poor magnifying equipment once again into consideration. Rafinesque very probably mistook the prehensorial distal (tarsungular) condyle, which is black, lateral, and almost inferior, for an eye. There can be no doubt that Rafinesque's *vittatus* is the valid name for the centipede which heretofore has been called *rubens*.

Genotypes

Selista Rafinesque, 1820. Proposed with one species.
TYPE: *Selista forceps* Rafinesque, 1820 [= *Scutigera coleoptrata* (Linne)] (Monobasic). Isogenotypic with *Scutigera* through synonymy.

Cryptomera Rafinesque, 1820. Proposed with two species.
TYPE: *Cryptomera nemura* Rafinesque, 1820 [= *Scutigera coleoptrata* (Linne)]. (Present designation). Isogenotypic with *Scutigera* through synonymy.

Stenomera Rafinesque, 1820. Proposed with one species.
TYPE: *Stenomera interrupta* Rafinesque, 1820 [= *Lithobius forficatus* (Linne)]. (Monobasic). Synonymous with *Lithobius*.

Mycotheres Rafinesque, 1820. Proposed with three species.
TYPE: *Mycotheres (Mycotheres) leucopoda* Rafinesque, 1820 [= *Cryptops hyalinus* Say, 1821 = *Cryptops (Cryptops) leucopodus* (Rafinesque)]. (Subgenerically monobasic: see Blackwelder, Bull. U. S. Nat. Mus., 200, p. 14, sec. e, 1952). Subjectively synonymous with *Cryptops*.

Exocera Rafinesque, 1820. Proposed as a subgenus of *Mycotheres* with one species.
TYPE: *Mycotheres (Exocera) Oligopoda* Rafinesque, 1820. (Monobasic and original designation).

Nemopleura Rafinesque, 1820. Proposed as subgenus of *Mycotheres* with one species.
TYPE: *Mycotheres (Nemopleura) vittata* Rafinesque, 1820 [= *Geophilus rubens* Say, 1821 = *Geophilus (Nemopleura) vittatus* (Rafinesque)]. (Monobasic).

DIPLOPODA

"X. N. G. PLEUROLOMA. Body oblong, convex above, unable to contract into a globe; many narrow segments, the middle ones larger, each with a marginal scale on each side and commonly two pairs of ventral legs, with four articles and a ciliated claw; the first segment of neck nearly concealed and without scales or feet. Head short; antennae lateral moniliform, with six oblong articles.—A fine genus next to *Glomeris:* the name means lateral margin. Hind legs shorter as in all the following three genera.

"49. *Pleuroloma flavipes.* Antenna grey, one-fifth of the body; head brown, transversely oblong; eyes black, back blackish shining, marginal scales reddish, eighteen segments and only thirty pairs of legs; belly, legs, and tail yellow, tail mucronate. Length one and half inches; eyes very small, lateral.—Found on the ground in the woods near Catskill in New York state."

PRESENT INTERPRETATION. Reference to alternating narrow and broad "segments", thirty leg pairs, and eighteen segments places this form in the order Polydesmida. Of the two families of this order occurring in northeastern United States, the Polydesmidae is eliminated by the statements "body . . . convex above", "back blackish . . . marginal scales reddish" and "Length one and half inches". The several polydesmids of the region are flattened dorsally and are uniform brown, and do not exceed 28 mm. in length. Remaining for consideration are two genera of the family Xystodesmidae: *Apheloria* and *Zinaria*. The first is represented in New York State by two species, *coriacea* (Koch), 1847, and *trimaculata* (Wood), 1864. *A. coriacea* is black dorsally, with reddish keels, but in addition has a promi-

nent bright yellow crossband on each tergite. *A. trimaculata* is blackish with three longitudinal rows of yellow spots on the dorsum. Neither of these conform to what is said about *flavipes*. There is, however, a species of *Zinaria* in the area under consideration which answers the Rafinesquean description very well, being blackish with reddish-orange keels. This species, not included in Causey's recent (1951) review of the genus, probably is distinct from all of the currently recognized forms. It may in all probability be that to which Wood (1865) restricted the name *Fontaria virginiensis*. As a consequence of this identification, *Zinaria* becomes a junior synonym of *Pleuroloma*. The characters of the population to which *flavipes* has been applied have not yet been made known, a deficiency which I hope to correct at an early date.

"XI. N. G. NARCEUS. Body cylindrical, with many narrow segments, each with two pairs of geminate legs, except the anterior segments which have only one pair. Head obtuse with a visible neck; eyes anterior irregular; antenna lateral hardly longer than head, recurved behind in a lateral groove, with six depressed articles, the second longer, the last globular. Legs with four articles and a claw, ventral, the posterior ones rather shorter. Tail scutiform, mutic, concealed beneath.—Next to *Julus:* the name is mythological.

"50. *Narceus tinctorius*. Black brown, 90 pairs of feet, pale purple; the six anterior segments with a single pair; tail obtuse, split beneath; length about three inches.—It is found in the woods of Kentucky. When handled it dyes the fingers of a purplish colour. Discovered by Mr. John D. Clifford."

PRESENT INTERPRETATION. This is certainly the easiest name to allocate. I have read the description to several persons, who have unhesitatingly identified it with one of the abundant and widespread spiroboloid species of eastern United States. The size, number of legs, coloration, and defensive exudation noted, all point to this group, which has in the past been referred to as *Spirobolus* by Wood, Bollman, and Chamberlin, or as *Arctobolus* by Cook and Loomis. The members of this genus are very poorly known, and their ranges imperfectly defined. Just what species occur in central Kentucky, I cannot say at present. If it happens to be the same as that of the Atlantic Coast, another change of name must be made, *tinctorius* falling as a synonym of *americanus* Beauvois, 1802. In all probability, however, the Kentucky population is at least subspecifically distinct.

However, it is not to be understood that *Spirobolus* Brandt, 1833, must become a junior synonym of *Narceus*. It was origi-

nally proposed for two species from China and Brazil, of which the former *(bungii* Brandt, from Pekin) was later (1894) designated by Pocock as type of the genus. Other spiroboloids from northeastern China, including the immediate vicinity of Pekin, doubtless congeneric with *bungii,* are generically distinct from the American species. Previous suggestions that *Julus marginatus* Say, 1821 be taken as the type of *Spirobolus* were made on the premise that *bungii* was a *nomen nudum,* which is not the case. In any event, *Narceus* is the oldest generic name available for the North American forms, and Rafinesque's reference to a type locality will facilitate a definite allocation of the name *tinctorius* within the near future.

"XII. N. G. RHEXENOR. Differs from *Narceus* by all the segments with two pairs of geminate ventral legs, having five articles and a claw. Eyes rounded in facets. Antenna nearly under the head, recurved upwards in a groove, with seven articles; six oblong, the sixth longer; the seventh or last depressed obtuse.—The name is also mythological.

"51. *Rhexenor annularis.* Bluish brown with reddish brown rings on the margin of the segments; legs brown, one hundred and ten pairs; neck broad, tail large, obtuse, split beneath; vent linear, margined with yellow.—Found in the woods of the highland hills of New York. Length three inches."

PRESENT INTERPRETATION. *Rhexenor* is said to differ from *Narceus* by having two pairs of legs on each of the anterior segments. This is clearly an error in observation, as no millipeds known to me are so endowed. It appears, therefore, considering the other characters mentioned, that *Rhexenor* is to be regarded as a junior synonym of *Narceus.* On the basis of locality, however, the trivial name may be considered valid. I do not doubt that it is based upon the form described by Cook in 1904 as *Arctobolus onandaga.* It will now be known as *Narceus annularis* (Rafinesque).

"XIII. N. G. ABACION. Differs from *Narceus* by anterior segments with two pairs of legs; neck hardly visible: head rounded, eyes rounded, lateral; antennae longer than the head, lateral before, straight, club-shaped, six oblong articles increasing in size upwards.—The name means little texture.

"52. *Abacion tesselatum.* Body reddish-brown, striated longitudinally, or tesselated; antennae more than double the length of head; legs pale, variable in number, about sixty pairs; tail acute.—I found it on the knobby hills of Estill county in Kentucky, under stones: length nearly two inches."

PRESENT INTERPRETATION. In the diagnosis of *Abacion* we again find the incorrect reference to two leg pairs on the anteriormost segments. In general there are some items which

render application of this name a little doubtful. At first reading, the description might seem to apply to either of the genera now known as *Spirostrephon* and *Cambala*, superficially similar although belonging to different orders, and it is not impossible that Rafinesque drew his description from species of both genera. However, consideration of each characteristic mentioned would seem to restrict the choice almost certainly to *Spirostrephon*. The following statements indicate lysiopetaloid rather than cambaloid features:

Eyes rounded; collum small; antennae twice as long as head; antennal articles increasing in size (length) upwards (distad); legs pale; found under stones.

In *Cambala*, the eyes consist each of a short linear series of ocelli partially concealed by the rather large collum; the antennae are not conspicuously longer than the head, and their joints generally are subequal in size; the legs are usually about the same color as the dark brown body; and specimens are rarely (at least in my experience) found under stones. On the other hand, *Spirostrephon* species in the Southern Appalachians are almost obligate saxicoles. I believe that on the basis of these considerations, *Spirostrephon* Brandt, 1841, must be regarded as a junior synonym of *Abacion* Rafinesque, 1820. It would, however, be premature to postulate conspecificity of the names *tesselatum* and *lactarium* Say, 1821, until specimens from Estill County, Kentucky, have been studied. The length of two inches cited for *tesselatum* more nearly approximates the large montane species which I recently named *highlandensis*.

Genotypes

Pleuroloma Rafinesque, 1820. Proposed with one species.
TYPE: *Pleuroloma flavipes* Rafinesque, 1820. (Monobasic).

Narceus Rafinesque, 1820. Proposed with one species.
TYPE: *Narceus tinctorius* Rafinesque, 1820. (Monobasic).

Rhexenor Refinesque, 1820. Proposed with one species.
TYPE: *Rhexenor annularis* Rafinesque, 1820 [= *Arctobolus onandaga* Cook, 1904 = *Narceus annularis* (Rafinesque)]. (Monobasic). Isogenotypic with *Narceus* through synonymy.

Abacion Rafinesque, 1820. Proposed with one species.
TYPE: *Abacion tesselatum* Rafinesque, 1820. (Monobasic).

NEWS AND COMMENTS

PALMER'S "APHIDS"

"Aphids of the Rocky Mountain Region" by Miriam A. Palmer has just been published by the Thomas Say Foundation. It consists of 452 pages, 8 colored plates, and 455 figures of line drawings providing additional accuracy in identification. Keys are provided for the subfamilies, tribes, genera and species.

Although the title indicates a restricted area, as a matter of fact, the volume includes practically all of the species in North America, north of Mexico.

The volume is priced at $10.25 postpaid in the United States, and for other countries $10.50 postpaid. It can be obtained from J. J. Davis, Purdue University, Lafayette, Indiana, and checks made payable to the Thomas Say Foundation.

* * * * *

INSECT COLLECTING IN NATIONAL PARKS

A recent action to simplify procedures governing the collection of scientific materials in areas administered by the National Park Service is of interest to entomologists.

Formerly, in order to collect insects and arachnids, it has been necessary for entomologists, other than federal employees, to qualify, through appointment by the Department of the Interior, as collaborators without compensation. This involved considerable paper work and delay, both for the applicant and the Government.

The new procedure, authority for which is set forth in *The Federal Register* of May 15, 1953 (18 FR 2831, 2832), excepts the collection of insects and arachnids from the federal employment requirement. It will now be possible for qualified entomologists to submit a simple application form by mail or in person to the Superintendent of the national park or monument concerned who is empowered to issue permits to make collections for scientific purposes.

The interests of science have been served well by regulations intended to preserve in the national parks and monuments a maximum of as nearly as possible undisturbed natural biological associations. Collection of specimens is limited to legitimate scientific collection of such nature as to have no measurable adverse effect upon the biological values involved.

ANNUAL MEETING OF THE FLORIDA ENTOMOLOGICAL SOCIETY

Plans are progressing smoothly in preparation for the next annual meeting of the Society to be held in Miami on September 10-11. Mr. Walter H. Thames, Everglades Experiment Station, has accepted the chairmanship of the Program Committee, while Dr. Jack Bellows, Miami, is heading the Entertainment and Hospitality Committee. Dr. D. O. Wolfenbarger of Homestead is serving as chairman of the Exhibit Committee. These chairmen would welcome suggestions or aid from any member of the Society to help in making this meeting the biggest and best ever held by the Florida Entomological Society.

* * * * *

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